

FACILITY AND METHOD FOR CELLULAR DATA COMMUNICATION BETWEEN  
MERCHANTS AND CREDIT PROCESSING AGENCIES

Field of the Invention

The present invention is directed to wireless communication, and more particularly to  
5 wireless data communication for verification of credit card purchases.

Background and Summary of the Invention

The use of credit cards for retail purchases is widespread. To ensure against fraud,  
10 merchants verify the legitimacy and capability of a purchaser by transmitting an  
identifying credit card number, a transaction monetary amount, and other information to a  
central agency associated with the card issuer. The issuer responds with an approval or  
denial of the transaction, based on whether the purchase is within the purchaser's  
15 available credit, and whether the card has been reported lost or stolen. Communication  
between the merchant and the issuer is by way of a merchant terminal connected via  
telephone lines to the issuer computer. The terminal includes what is essentially a modem  
that operates to convert digital data into audible tones transmissible over phone lines, and  
20 which may be demodulated and reconverted to the data by the recipient.

While useful for many merchants, other merchants seeking to accept credit cards  
do not have telephone lines available, and therefore may not accept credit cards. Such  
merchants include those at remote locations, those with temporary locations of operation,  
20 and those in other transitory circumstances where the wiring of telephones is impractical.

Examples include: a small merchant at a seasonal craft fair, a large traveling entertainment production such as a circus or touring Broadway show, and wandering food and souvenir vendors at stadium events. For a merchant without telephone lines to accept a credit card, he may use a wireless telephone to make a voice communication with a 5 human operator at the verification agency, reading the credit card number and purchase price information aloud, and listening for the operator to verbally issue an approval or denial. However, this introduces delay and inconvenience, increases operating costs of the agency, and risks that the spoken confidential information is overheard, leading to fraud.

10 While credit card terminals, with their card scanning transducers, keypads, and electronic displays are readily connected to conventional phone lines, they are incompatible with digital cellular networks. The technical reason that the terminal cannot communicate over digital cellular networks is the "vocoders" in the cellular voice transmission path. These vocoders compress the voice signals, making more 15 conversations possible in the same bandwidth, thereby conserving spectrum. While effective for transmitting spoken words, the compression responds to modem tones in a way that corrupts the data carried therein, and renders the result unusable. The terminal modem used to send data over the wire-line network is not able to send data through the cellular voice path. Some digital cellular networks have data paths separate from the 20 voice path that could be used to send data to a selected receiving location. However, even in these cases, the terminal is not able to connect to the mobile data ports of these phones.

The present invention overcomes the limitations of the prior art by providing a wireless financial transaction verification facility that has a transaction information terminal for scanning credit cards and entering a purchase price, and which communicates information in a first 25 electronic format. A converter is connected to the terminal and operates to convert the information to a second format transmissible by a digital cellular network. A wireless

communication device is connected to the converter, and operates to communicate with the network in the second format. At a central financial agency, a similar converter may convert the information from the digital wireless transmissible format to a different format. Reply communication with approval or other information may proceed by the 5 same means.

#### Brief Description of the Drawings

Figure 1 is a high-level block diagram showing the environment in which the facility preferably operates.

#### Detailed Description of a Preferred Embodiment

Figure 1 shows a financial transaction verification system 10 including a wireless or cellular network 12 with a user system connected to the network. The cellular network is connected to a conventional telephone system 16. A central verification facility 20 such as a bank, credit card issuer, or agency is connected to the system 16.

The user system includes a digital cellular telephone 22 having an antenna 24 communicating with the cellular network 12. The phone includes circuitry that encodes vocal communications digitally, in a highly compressed format that allows a conversation to be transmitted with limited bandwidth. The circuitry also includes receiving capabilities that receive such a digital stream, and convert it into an audible facsimile of the original words spoken by a caller with whom the user is speaking. The phone 22 includes a conventional ear piece and microphone, as well as a supplementary connector 26 of the type used for communication with accessories such as hands-free headsets. The connector has several lines, some of which are a remote analog microphone input and an analog speaker output.

A converter 30 is connected to the phone connector via a cable 32. The converter is described in U.S. Patent No. 6,144,336, by Dan Preston, et al., entitled SYSTEM AND 25 METHOD TO COMMUNICATE TIME STAMPED, 3-AXIS GEO-POSITION DATA WITHIN

TELECOMMUNICATION NETWORKS, issued November 7, 2000, and which is incorporated herein by reference.

The converter includes a connector 34, to which a conventional credit card verification terminal 36 is connected via a cable 40. The terminal 36 includes an alphanumeric display 42 for 5 displaying text to a user based on encoded signals received via cable 40. The terminal 36 includes a keyboard or other input device 44 for the user to enter transaction information to be encoded and transmitted via the cable to the converter. A magnetic credit card reader slot 46 is an input device that reads unique data encoded on a magnetic strip on a purchaser's credit card 48. In alternative embodiments, the credit card may include data encoded by other means, such 10 as a memory chip that records information beyond identifying the card, including balance and available credit. Other alternative terminals may collect purchaser information by other means, including biometric data contained in fingerprints. In addition, references to "credit cards" is intended to include all means for purchases and other financial transactions, including debit 15 cards, bank draft verification, and other means of credit extension in which information or qualification asserted by a purchaser needs to be verified.

The terminal 36 operates conventionally, and includes what is essentially a modem that converts the scanned or entered data to be sent from a digital form to a modulated tonal pattern transmissible via conventional telephone lines; it further operates to receive such a modulated 20 audio signal and convert it to digital form for display.

The central verification facility 20 is connected to the telephone network via phone lines 25. A converter 52 that is essentially functionally identical to converter 30 is connected via line 50. A converter 52 that is essentially functionally identical to converter 30 is connected via line 54 to line 50. A computer system 56 is connected via line 60 to the converter 52, and includes or connects to a financial database containing information about the purchaser's credit card, credit history, account balance or available credit, and other financial status, including whether or not 20 the credit card is listed as stolen. In alternative embodiments, a computer terminal permitting

human operator involvement may be connected, for instances in which a judgement must be made about whether or not to approve a proposed purchase or transaction.

The converter 52 need not be a separately housed device, but may be included as an internal circuit board in existing systems, or integrated into the circuitry and or software of 5 systems. As with the user system 14, the facility system 20 operates both for transmission and receiving of messages in text format.

The system in the facility 20 is shown in a simplified form to illustrate the preferred embodiment. As shown, it is connected to a telephone line that may have a special phone number for use by wireless terminal users. Routing hardware and or software between line 50 10 and the converter 52 would analyze the characteristics of each call received to identify whether the call was a conventional inquiry from a standard terminal using a communication format via a wired line, or whether it was in the special encoded format generated by a converter 30. Based on this determination, the router directs calls to bypass the converter 52, and directs encoded calls to the computer 56 via the converter 52.

The system operates as follows: A merchant having a system 14 wishes to accept a 15 customer's credit card 48. If the merchant system's components are not set up, the merchant connects the components as shown. The phone 22 is activated, and the verification system 20 number is dialed by the merchant. Other phone functions also may be conducted by using the device keyboard 44. In any case, the terminal 36 is used to generate a communication for the center to receive. The communication may be a standardized inquiry identifying the customer's account number and purchase amount, possibly including other information such as PIN number, and other identifiers.

The message generated in the terminal 36 is modulated to an audible stream of tones, 25 which are transmitted to the converter 30. The converter converts this signal into a data stream in encoded format that is readily transmitted via digital cellular networks, as described in the

incorporated reference. The phone then transmits this encoded stream to a receiver node on the network 12, which transmits the stream via the conventional telephone network to the facility 20.

The facility identifies the stream as an encoded stream in the transmissible format, and if necessary, routes the call to the converter 52. The converter 52 converts the encoded stream into 5 the modulated audible tone signal, which is demodulated by a modem in the computer 56, and processed. Upon processing the transmitted message, the computer generates a reply message. This may be a simple indication of approval or denial of a transaction, or may include other information such as whether a credit card has been stolen or requires confiscation. The return communication follows the same path as the original communication, being modulated by the 10 modem in the computer 56, converted to the transmissible format by the converter 52, and transmitted via networks 16 and 12 to be received by the merchant's phone 22. The encoded stream is converted to a modulated pattern of tones by converter 30, which tones are demodulated into digital form by the terminal 36 for display to the user.

While the above is discussed in terms of preferred and alternative embodiments, the invention is not intended to be so limited. For instance, the component's of the merchant system 14 may be combined or integrated. All may be included in a single device, the telephone may incorporate the decoder circuitry, and/or the terminal may incorporate the decoder circuitry.